

**Email Attachment From: Mike Socha, Zinpro Corporation**  
**Subject:**

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To Whom It May Concern

As the manufacturer of the products ZINPRO® zinc methionine and 4-Plex®, the combination of zinc methionine, manganese methionine, copper lysine and cobalt glucoheptonate, Zinpro Corporation supports leaving complexed minerals on the National List.

The benefits of feeding these complexed trace minerals versus feeding inorganic sources of zinc or zinc, manganese, copper and cobalt is that trace mineral status of cattle can be maintained or improved while maintaining or decreasing the amount of supplemental trace minerals.

Complexed trace minerals are more effective in meeting the trace mineral needs of the animals because the amino acid that is complexed to the trace mineral prevents antagonists from binding to the trace mineral and it minimizes the competition for ligands for absorption.

Some common dietary interactions that reduce the availability of trace minerals include:

- Zinc's availability is reduced by calcium, copper, iron, fiber and phytate
- Copper's availability is reduced by iron, sulfur, molybdenum and zinc. The zinc/copper interaction is alleviated to a certain extent by maintaining the zinc:copper between 3:1 and 5:1
- Manganese's availability is reduced by calcium, potassium, iron, magnesium and phosphorus
- Cobalt's availability is reduced by manganese, zinc and iodine

Due to the large number of interactions, it is important to maintain a balance between trace minerals without over supplementing trace minerals. The concern is that feedstuffs, pasture and water can vary considerably in mineral content due agronomic practices, soil types and seasonal variations. Some soils are high in molybdenum and hence plant materials grown on these soils have high molybdenum content. Copper content of pasture can vary from spring to fall. In addition, consumption of iron due to soil contamination of plant material can vary due to muddy, wet conditions and dry, dusty conditions. Mineral content of water can vary from source to source. While some sources have a relatively low mineral content, other wells can contain high amounts of calcium, magnesium and sulfur. Due to these variables, cattle can develop subclinical trace mineral deficiencies.

Feeding complexed trace minerals such as zinc methionine, manganese methionine and copper lysine is one way to insure that cattle have adequate trace mineral status while minimizing the risk of over supplementing cattle.

Benefits to the animal from feeding zinc methionine, manganese methionine, copper lysine and cobalt glucoheptonate include:

- Reduced lameness – Lameness is considered one of the most painful diseases in livestock (Shearer and Van Amstel, 2000). Lameness is as big of a concern for

pasture animals as confinement animals. Problems to pasture animals include foot rot, excess wear due to walking long distances and soft claws (hooves) due to wet conditions. Excess wear results in thin soles and eventually sole ulcers. Cows under pasture conditions can be very susceptible to white line separation. In many cases of white line separation, horn of the white line has fallen out and dirt and rocks have been pushed up into the claw resulting in an abscess. The trace minerals found in zinc methionine (zinc) and 4-Plex (zinc, copper, manganese and cobalt) play important roles in maintaining claw (hoof) integrity. Research indicates that zinc methionine reduces lameness in cattle (Moore et al., 1988; Brazle, 1993) and sheep (Berg 1984). Recent research shows that feeding 4-Plex results in improved claw integrity over feeding only zinc methionine (Nocek et al., 2000).

- Improved fertility – Maintaining a tight calving window is important in both confinement and pasture dairies. For pasture dairies, maintaining a short calving window allows producers to maximize utilization of pasture growth, especially the spring flush. Graham et al. (1992) observed a significant decrease in spontaneous abortion in cows supplemented with zinc methionine. A summary of 8 dairy trials indicate that cows fed 4-Plex have 7 fewer days to first service and 18 fewer days open (Kellogg et al., 2003). Campbell et al. (1999) observed small numeric responses on reproduction to feeding 4-Plex when cows did not retain placentas. However, when placentas were retained, cows fed 4-Plex showed estrus 37 days sooner, first luteal activity 11.8 days earlier and first corpus luteum 5.4 days earlier than cows that did not receive 4-Plex. Overall, feeding 4-Plex reduced days to first estrus. Results from this study indicate that cows fed 4-Plex were better able to respond to stress such as retained placentas, as evidenced by the quicker return to normal ovarian activity.
- Improve immune function – In a summary of 12 trials, feeding zinc methionine has been shown to reduce somatic cell counts by 33% (Tomlinson et al., 2002). Research indicates that animals fed zinc methionine have faster recovery from disease challenge (Galton, 1989; Chirase et al., 1991; Jones, 1995) and increased vaccination response (Spears et al., 1991). Cattle fed 4-Plex had less sick incidents (Groteluechen et al., 1995), better cell-mediated immunity (Ward et al., 1992; George et al., 1997; Ansotegui et al., 1994) and increased vaccination response (George et al., 1997).

It is Zinpro Corporation's recommendation that zinc methionine, manganese methionine, copper lysine and cobalt glucoheptonate be fed year round. Maintaining sound claw development is one reason. Horn on the sole of the claw requires 2 to 3 months from the time it is produced until it reaches the wear surface. Horn on the wall requires 12 to 15 months and horn of the white line requires 6 to 8 months from the time it is produced until it reaches the wear surface.

The dry period is an especially important period to supplement with complexed trace minerals. Research indicates that periparturient cows are immune suppressed and most susceptible to mastitis and uterine infections. Research at Texas Tech (Branum et al., 1998) indicates that cows that do not have adequate copper status are more prone to mastitis at calving. This is of particular concern as the cow partitions copper to the calf during the last trimester of pregnancy even at the expense of depleting her copper reserves.

Currently Horizon Organic Dairy and Organic Valley Producers use the products zinc methionine and zinc methionine, manganese methionine, copper lysine and cobalt glucoheptonate. We feel that keeping these products to the National List will allow these producers to continue to produce the high quality organic products while meeting the stringent requirements of producing certified organic products.

Please let us know if you have any questions.

Sincerely

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Ansotegui, R.P., C.K. Swenson, E.J. Swenson, T.J. Milner, K.S. Bryan and J.A. Paterson.  
1994. Effects of Chemical Form and Intake of Mineral Supplementation on Blood  
Profiles  
and Inflammatory Reaction to Phytohemagglutinin (PHA-P) in Pregnant Heifers.  
Western  
Proceedings, ASAS Vol.45, p222

Berg, J. N. 1984. Zinpro Final Report. Technical Bulletin TB O-8549.

Branum, J. C., G. E. Carstens, E. H. McPhail, K. W. McBride and A. B. Johnson. 1998.  
Effects of prenatal dietary copper level on immune function of calves at birth and 56  
days of age. J. Anim. Sci. 76(Suppl.1):43 abstr.

Brazle, F. K. 1993. J. Dairy Sci. 76(Suppl. 2): 36. abstr.

Campbell, M. H., J. K. Miller and F. N. Schrick. 1999. Effect of additional cobalt, copper,  
manganese and zinc on reproduction and milk yield of lactating dairy cows receiving  
bovine somatotropin. J. Dairy Sci. 82:1019

Chirase, N. K., D. P. Hutcheson and G. B. Thompson. 1991. Feed Intake, Rectal  
Temperature, Serum Mineral Concentrations of Feedlot Cattle Fed Zinc Oxide or Zinc  
Methionine and Challenged with Infectious Bovine Rhinotracheitis Virus. J. Anim. Sci.  
69:4137.

Gal Galton, D. 1989. Effect of Feeding ZINPRO<sup>®</sup> zinc methionine to Lactating Dairy Cows on  
Udder  
Health. TB-8911. Zinpro Corporation.

George, M.H., C.F. Nockels, T.L. Stanton and A. B. Johnson. 1997. Effect of Source and  
Amount of Zinc, Copper, Manganese and Cobalt Fed to Stressed Heifers on Feedlot  
Performance and Immune Function. Professional Animal Scientist 13:84.

Graham, T.W., M.C. Thurmond, F.C. Mohr, C.A. Holmberg and C.L. Keen. 1992. Zn  
Supplement Status and Plasma Metallothionein, ZN and CU for Predicting Measures  
of  
Health in Typically Fed Dairy Cows. FASEB 6:A16810

Grotelueschen, D.M., A. Wohlers, C. Dewey, I.G. Rush, W.E. Braselton, A.B. Johnson, and  
J.P. Pollreiz. 1995. Effect of Pasture Trace Mineral Supplementation on Liver Mineral  
Levels and Feedlot Morbidity and Mortality. Final Report. Zinpro Corporation.  
Publication *In Press*

Jones, C. A. 1995. Effect of zinc source on zinc retention and animal health. M.S. Thesis. University of Missouri-  
Columbia

Kellogg, D. W., M. T. Socha, D. J. Tomlinson and A. B. Johnson. 2003. Effects of feeding cobalt glucoheptonate  
and metal specific amino acid complexes of zinc, manganese, and copper on lactation and reproductive

performance of dairy cattle. Professional Animal Scientist 19:1.

Maas, J., J. N. Berg, and R. G. Peterson. 1989. Am. J. Vet. Research 50(10):1758-1759.

Moore, C. L., P. M. Walker, J. R. Winter, M. A. Jones, and J. M. Webb. 1989. Zinc methionine supplementation for dairy cattle. Trans. Ill. Acad. Sci. 82:99.

Nocek, J. E, A. B. Johnson and M. T. Socha. 2000. Digital Characteristics in Commercial Dairy Herds Fed Metal-Specific Amino Acid Complexes. J. Dairy Sci. 83:1553.

Shearer, J. K. and S. R. van Amstel. 2000. Functional and Corrective Trimming Procedures for Management of Claw Disorders in Dairy Cattle. Proceedings from Midwest Dairy Herd Health Conference 2000, November 14-15, 2000, Appleton, WI.

Spears, J. W., R. W. Harvey and T.T Brown. Effects of Zinc Methionine and Zinc Oxide on Performance, Blood Characteristics, and Antibody Titer Response to Viral Vaccination In Stressed Feeder Calves. JAVMA 199:1731.

Tomlinson, D. J., M. T. Socha, C. J. Rapp and A. B. Johnson. 2002. Summary of twelve trials evaluating the effect of feeding complexed zinc methionine on lactation performance of dairy cattle. J. Dairy Sci. 85(Suppl. 1):107 abstr.

Ward, J.D., J.W. Spears and E.B. Kegley. 1992. Effect of Trace Mineral Source on Mineral Metabolism, Performance and Immune Response in Stressed Cattle. J. Anim. Sci..70: Supplement 1, #642.